39. (New) The system according to claim 34, wherein, in step (a), the processing arrangement segments said nodes and said edges, and wherein, in step (c), the processing arrangement implements said minimum-cut algorithm on said segmented nodes and edges.

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40. (New) The software storage medium according to claim 36, wherein the first module segments said nodes and said edges, and wherein the third module implements said minimum-cut algorithm on said segmented nodes and edges.--.

REMARKS

I. GENERAL

New claims 38-40 have been added to the above-identified application. Accordingly, claims 1-40 are now under consideration in the present application. Applicants respectfully submit that no new matter has been added.

II. THE REJECTION UNDER 35 U.S.C. § 103(a) SHOULD BE WITHDRAWN

Claims 1-14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,201,035 issued to Stytz et al. (the "Stytz Patent"), in view of U.S. Patent No. 5,797,012 issued to Blainey et al. (the "Blainey Patent"). It is respectfully asserted that independent claims 1, 15 and 34-37, and claims 2-14 and 16-

33 which depend from claims 1 and 15, respectively, are in no way taught or suggested by the alleged combination of the Stytz and Blainey Patents for at least the reasons set forth below.

In order for a claim to be rejected for obviousness under 35 U.S.C. § 103, not only must the prior art teach or suggest each element of the claim, the prior art must also suggest combining the elements in the manner contemplated by the claim. *See Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 934 (Fed. Cir.), *cert. denied* 111 S.Ct. 296 (1990); *see In re Bond*, 910 F.2d 831, 834 (Fed. Cir. 1990).

One exemplary embodiment of Applicants' invention, as recited in independent claim 1, relates to a method of segmenting input data representing an image in order to locate a part of said image, with the input data comprising voxels. The method comprises the steps of, *inter alia*:

(a) storing a graph data structure in memory of a computer system, said graph data structure comprising nodes and edges having weights, ... **said nodes comprising at least one first node s, at least one second node t, and a plurality of voxel nodes** ...;

(b) **designating one of said voxel nodes as corresponding voxel node for each of said voxels**;

(c) **partitioning said nodes into at least two groups, one including said first node s and another one including said second node t, by a minimum-cut algorithm**; and

(d) **partitioning said voxels into at least two segments by assigning each of said voxels to the segment corresponding to the group to which said corresponding voxel node for the voxel belongs**.

Independent claims 34 and 36 relate to a system and software storage medium, respectively, and recite similar subject matter.

Another exemplary embodiment of Applicants' invention, as recited in independent claim 15, relates to a method for associating particular data in a space which has at least three dimensions. The method comprises the steps of, *inter alia*:

- receiving first data corresponding to at least one first point in the space, **the first data for each one of the at least one first point including first information indicative of a likelihood of an association of the first data to at least a first part of the respective first point**;
- receiving second data corresponding to at least one second point in the space, **the second data for each one of the at least one second point including second information indicative of a likelihood of an association of the second data to at least a second part of the respective second point**; and
- associating the first and second points to the respective first and second parts based on the first and second information.

Independent claims 35 and 37 relate to a system and software storage medium, respectively, and recite similar subject matter.

The Stytz Patent relates to a dynamic algorithm selection to accomplish volume rendering along with isocontour and body extraction with a multiple-instruction, multiple-data microprocessor. (See Stytz Patent, column 1, lines 15-18). According to the description provided in the Stytz Patent, with this technique, the time required to anti-alias, extract isocontours, and render a volume of interest within a three-dimensional volume is reduced. (See *id.*, column 2, lines 52-56). The volume is first partitioned among the processors of a multiple-instruction, multiple-data (MIMD)

microprocessor computer. As the user indicates the isocontour to be extracted and a cutting plane location within the image space volume, each microprocessor independently selects the optimum algorithm for rendering a portion of the volume represented by its local data set. (See *id.*, column 2, lines 56-63). Each microprocessor independently selects the optimum algorithm for rendering the volume of a suite of algorithms, based on desired cutting plane location and isocontour to be displayed. (See *id.*, column 2, line 64 to column 3, line 2).

The Stytz Patent describes the use of recursive volume rendering (hidden-surface removal – HSR) algorithms and adapted recursive BTF (back-to-front) and FTB (front-to-back) volume rendering algorithms. (See *id.*, column 4, lines 50-58). The selection of an algorithm cutover point is described in the Stytz Patent with reference to Fig. 6 thereof. In particular, the basis for selecting either the adaptive FTB or BTF algorithm is the z'-dimension location of the cutting plane in image space. For the cutting planes close to the front of the scene, the adaptive BTF algorithm must process most of the data, whereas the adaptive FTB algorithm processes relatively little, giving the FTB algorithm the performance edge. As the cutting plane moves deeper into the scene, the two algorithms approach the same performance until, at the cutover point, the overhead of the adaptive FTB algorithm equals the pixel overwriting cost of the adaptive BTF algorithm. From the cutover point to the back of the scene, the adaptive BTF algorithm is faster than the adaptive FTB algorithm. (See *id.*, column 13, lines 23-37; and Fig. 6).

In the Office Action dated December 18, 2002, the Examiner admits that the Stytz Patent "does not teach a graph structure that demonstrates nodes in terms of edges and the partitioning process." (See Office Action, page 2, lines 18-19). However, the Examiner apparently believes that the Blainey Patent cures these deficiencies.

The Blainey Patent relates to a method for partitioning programs into modules for an efficient compilation so as to pass through the compiler modular partitions of the program that are of a significant size, without overloading the system constraints on the memory size, while minimizing the grouping of conflicting attributes. (See Blainey Patent column 1, line 66 to column 2 line 5). In particular, the computer program is compiled into compilation units in a multi-pass compiler. With such compilation, it is possible to generate a call-weighted multigraph having nodes denoting procedures in the computer program, weights on the nodes denoting relative intermediate code size, edges between the nodes representing execution calls, and edge weights representing estimated or actual execution call frequency. (See *id.*, column 3, lines 1-9). The edge weights are sorted from highest to lowest, an edge is selected having a highest edge weigh, as well as any node or nodes connecting to such edge remaining for the selection, and the weight of the selected node or nodes is aggregated. Then, the edge and the selected node or nodes are divided into a compilation unit having an aggregate node weight not exceeding the size constraint on memory when the aggregate weight of the selected node or nodes is added, and the

selected edge and the selected node or nodes are removed from selection. This procedure is performed for all edges (See *id.*, column 3, lines 1-9).

A. CLAIMS 1-14, 34 AND 36

As an initial matter and for at least the same reasons as discussed in great detain in Applicants' Amendment dated September 23, 2002, Applicants respectfully assert that the Stytz Patent does not teach or suggest a method, system and software storage medium that segment input data (which includes voxel) representing an image in order to locate a part of the image, in which, *inter alia*, **nodes are partitioned into at least two groups by a minimum-cut algorithm**, as recited in independent claims 1, 34 and 36, respectively. For example, the minimum "cut" as recited in Applicants' claims can separate the nodes according to a defined optimization criterion on the data associated with the voxels. Th Stytz Patent only describes the use of recursive volume rendering HSR algorithms and adapted recursive BTF and FTB volume rendering algorithms (see Stytz Patent, column 4, lines 50-58), but does not even mention, much less teach or suggest the use of the minimum-cut algorithm, as explicitly recited in independent claims 1, 34 and 36.

The Blainey Patent does not cure at least these deficiencies of the Stytz Patent, nor does the Examiner contends that it does. Further, at least because claims 2-14 depend, either directly or indirectly, from independent claim 1, Applicants

respectfully assert that claims 2-14 are also not taught or suggested by the alleged combination of the Stytz Patent and the Blainey Patent for at least the same reasons.

In addition, Applicants respectfully assert that the alleged combination of the Stytz Patent and the Blainey Patent does not teach or suggest that **the voxels are partitioned into at least two segments by assigning each of the voxels to the segment corresponding to the group (partitioned by the minimum-cut algorithm) to which a corresponding voxel node for the voxel belongs**, as also recited in independent claims 1, 34 and 36 of the above-identified application, respectively. In particular, as Applicants previously argued, the Stytz Patent in no way partitions the voxels into at least two segments by assigning each of the voxels to the segment corresponding to the group to which a corresponding voxel node for the voxel belongs. The Blainey Patent does not cure this deficiency of the Stytz Patent. While the Blainey Patent describes dividing the edge and selected nodes into a compilation unit, the nodes described in the Blainey Patent are in no way voxels, and thus this publication does not teach or suggests assigning any voxels to the segment corresponding to the group to which a voxel node for such voxel belongs. Furthermore, the Blainey Patent does not teach or suggest that the voxel is assigned to a segment corresponding to the group *that was partitioned by the minimum-cut algorithm.*

Accordingly, the alleged combination of the Stytz and Blainey Patents does not teach or suggest the subject matter recited in independent claims 1, 34 and 36.

With respect to claim 8, this claim recites the assignment of weights to first and second edges **which are associated with likelihood numbers for the voxels**. In the Office Action, the Examiner is not referring to any section of the Stytz Patent or the Blainey Patent to provide the teaching or suggestion for such recitation. Indeed, the Stytz Patent does not even mention using any weights associated with the edges. The Blainey Patent describes edge weights actual or estimated call frequency. (See Blainey Patent, column 3, lines 7-9). In particular, the "weight" of an edge between two procedures as described in the Blainey Patent represents the execution count, i.e., the number of times that one procedure calls another. (See *id.*, column 3, lines 50-52). However, the Blainey Patent in no way teaches or suggests that the weights are associated with **likelihood numbers for the voxels**, as recited in claim 8.

Therefore, an affirmation of patentability is respectfully requested for pending claims 1-14, 34 and 36.

B. CLAIMS 15-33, 35 AND 37

With respect to independent claims 15, 35 and 37, Applicants respectfully assert that the alleged combination of the Stytz Patent and the Blainey Patent does not teach or suggest a method, system and software storage medium for associating particular data in a space which has at least three dimensions, in which, *inter alia*, **first and second data (each corresponding to a respective point in the three-dimensional space) are received for each point, and include respective**

information indicative of a likelihood of an association of the respective first and second data to a part of the respective points, as recited in independent claims 1, 35 and 37, respectively. Neither the Stytz Patent nor the Blainey Patent describe that the data which correspond to respective points in the three-dimensional space include information indicative of *a likelihood of an association of the data to the respective points*. Indeed, the Blainey Patent describes the use of "weights" for an edge between two procedure nodes, which represent the number of times that one procedure calls another. (See Blainey Patent, column 3, lines 50-52). However, these weights of the Blainey Patent are no way indicative of any likelihood of association between the received data and the points in the three-dimensional space, as explicitly recited in independent claims 15, 35 and 37.

At least because claims 16-33 depend, either directly or indirectly, from independent claim 15, Applicants respectfully assert that claims 16-33 are also not taught or suggested by the alleged combination of the Stytz Patent and the Blainey Patent for at least the same reasons.

Further, with respect to claims 17 and 18, these claims recite that the respective points are associated with the corresponding parts **if the respective weights indicate a higher likelihood for such association**. Since neither the Stytz Patent nor the Blainey Patent have any teaching or suggestion of using the likelihood of the associations (as described above), it follows that there is no teaching or suggestion

of making the association *if the respective weight indicate a higher likelihood for such association*.

In addition, with respect to claim 21, this claim recites that another **weight influences whether the at least one first point can be placed separately into the respective part from the second point**. In fact, neither the Stytz Patent nor the Blainey Patent teach or suggest that the weights can be used to influence whether one point can be placed separately from the second point.

Further, with respect to claim 26-29 and 33, these claims provide detailed recitations regarding additional subject matter of Applicants' invention (including associations, costs, and thresholds). However, in the Office Action, the Examiner states that the Stytz Patent "teaches the voxel data model representing data elements with array values", but does not point to the Stytz Patent or the Blainey Patent as teaching or suggesting the specific recited features of claim 26-29 and 33. Indeed, it is respectfully asserted that neither the Stytz Patent nor the Blainey Patent, either taken alone or in combination, teach or suggest at least these claimed features.

Therefore, an affirmation of patentability is respectfully requested for pending claims 15-33, 35 and 37.

C. SUMMARY

Accordingly, Applicants respectfully request that the rejection of claims 1-37 under 35 U.S.C. § 103(a) as being unpatentable over the Stytz Patent in view of the Blainey Patent be withdrawn.

III. NEW CLAIMS 38-40

New claims 38-40 are presented to cover further aspects of Applicants' invention. Support for new claims 38-40 can be found throughout the specification and in the drawings. New claims 38-40 depend from independent claims 1, 34 and 36, respectively. Accordingly, these claims should be patentable for at least the same reasons as discussed above with respect top independent claims 1, 34 and 36.

IV. INFORMATION DISCLOSURE STATEMENT

On September 30, 2002, Information Disclosure Statement and corresponding PTO-1449 form were mailed to the U.S. Patent and Trademark Office for the above-identified application. However, the initialed PTO-1449 form was not returned to Applicants along with the last Office Action. Copies of the submitted Information Disclosure Statement and corresponding PTO-1449 form are enclosed herewith. It is respectfully requested that the Examiner initial the enclosed (and previously submitted) PTO-1449 form, and return the initialed form to Applicants in the next communication.

V. CONCLUSION

In light of the foregoing, Applicants respectfully submit that pending claims 1-40 are in condition for allowance. Prompt reconsideration and allowance of the present application are therefore earnestly solicited.

Respectfully submitted,

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